

ANTIMONY TRIOXIDE

MEDITEXT(R) - Medical Management

0.0 OVERVIEW

0.1 LIFE SUPPORT

A. This overview assumes that basic life support measures have been instituted.

0.2 CLINICAL EFFECTS

0.2.1 SUMMARY OF EXPOSURE

0.2.1.1 ACUTE EXPOSURE

A. The primary toxicity of antimony trioxide is pulmonary, but myocardial, liver, and kidney damage as well as mucous membrane irritation may be seen.

0.2.4 HEENT

0.2.4.1 ACUTE EXPOSURE

A. Conjunctivitis was reported due to exposure to antimony trioxide dust.

0.2.5 CARDIOVASCULAR

0.2.5.1 ACUTE EXPOSURE

A. Myocardial damage was seen in animals chronically exposed to antimony trioxide.

0.2.6 RESPIRATORY

0.2.6.1 ACUTE EXPOSURE

A. Interstitial fibrosis and pneumoconiosis have been seen after exposure to dust of antimony trioxide. Emphysema may also occur.

0.2.8 GASTROINTESTINAL

0.2.8.1 ACUTE EXPOSURE

A. Hypertrophy of splenic follicles was seen in animals exposed chronically.

0.2.9 HEPATIC

0.2.9.1 ACUTE EXPOSURE

A. Fatty degeneration of the liver was seen in most animals exposed to chronic daily inhalations.

0.2.13 HEMATOLOGIC

0.2.13.1 ACUTE EXPOSURE

A. Anemia as well as decreased white count and polymorphonuclear leucocytes reduction was seen in animals

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0.2.14 DERMATOLOGIC

0.2.14.1 ACUTE EXPOSURE

A. Antimony Spots is a rash consisting of papules and pustules surrounding sweat and sebaceous glands. They are primarily found on forearms, thighs and areas where clothing is tight.

0.2.21 CARCINOGENICITY

0.2.21.2 HUMAN OVERVIEW

A. Some animal studies indicate that long term exposure to antimony trioxide is carcinogenic. Data on its carcinogenicity are conflicting and this is still being investigated.

0.2.21.3 ANIMAL OVERVIEW

A. Antimony trioxide was not carcinogenic in rats by inhalation at doses as high as 4.5 mg/m(3) for 12 months (Newton et al, 1994).

0.3 MEDICAL SURVEILLANCE/LABORATORY

A. A urine assay can be used to confirm diagnosis. Levels of 1.0 mg/L may indicate a potentially harmful antimony exposure.

0.4 TREATMENT OVERVIEW

0.4.1 SUMMARY EXPOSURE

A. Treatment is primarily supportive. Chelators such as BAL and unithiol have been used in some countries.

0.4.2 ORAL EXPOSURE

A. EMESIS: May be indicated in recent substantial ingestion unless the patient is or could rapidly become obtunded, comatose or convulsing. Is most effective if initiated within 30 minutes. (Dose of Ipecac Syrup: ADULT: 30 mL; CHILD 1 to 12 years: 15 mL).

B. ACTIVATED CHARCOAL/CATHARTIC: Administer charcoal slurry, aqueous or mixed with saline cathartic or sorbitol. The FDA suggests 240 mL of diluent/30 g of charcoal. Usual charcoal dose is 30 to 100 grams in adults and 15 to 30 grams in children (1 to 2 g/kg in infants).

1. Administer one dose of a cathartic, mixed with charcoal or given separately. See "Treatment: Prevention of Absorption" in the main document.

C. Chelators such as BAL and unithiol have been used to decrease serum antimony levels.

0.4.3 INHALATION EXPOSURE

A. DECONTAMINATION: Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer 100 percent humidified supplemental oxygen with assisted ventilation as required.

0.4.4 EYE EXPOSURE

A. DECONTAMINATION: Exposed eyes should be irrigated with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist, the patient should be seen in a health care facility.

0.4.5 DERMAL EXPOSURE

A. DECONTAMINATION: Wash exposed area extremely thoroughly with soap and water. A physician may need to examine the area if irritation or pain persists.

0.5 RANGE OF TOXICITY

A. Exposure to 0.5 to 5 mg/m(3) of dust and fumes in antimony plant resulted in only radiographic changes without systemic toxicity.

B. TLV (US) - None. USSR - 1 mg/m(3).

1.0 SUBSTANCES INCLUDED/SYNONYMS

1.1 THERAPEUTIC/TOXIC CLASS

A. Antimony trioxide is used as a flame retardant in plastics (especially PVC), textiles and other materials (Rathjen, 1980). It is also used in pigments and ceramics and for staining iron and copper.

B. It is often contaminated with arsenic. Air levels of arsenic at factory sites showed levels to range from 1 to 20 mcg/m(3) and averaged 5.6 mcg/m(3) (ACGIH, 1986).

1.2 SPECIFIC SUBSTANCES

ANTIMONY TRIOXIDE

A 1530

A 1582

A 1588LP

AMSPEC-KR

ANTIMONIOUS OXIDE

ANTIMONY OXIDE

ANTIMONY(3+) OXIDE

ANTIMONY PEROXIDE

ANTIMONY SESQUIOXIDE

ANTIMONY WHITE

ANTOX

ANZON-TMS

AP 50

BLUE STAR

CHEMETRON FIRE SHIELD

C.I. PIGMENT WHITE 11

DECHLORANE A-O

DIANTIMONY TRIOXIDE

EXITELITE

EXTREMA

FLOWERS OF ANTIMONY

NYACOL A 1510LP

NYACOL A 1530

SENARMONTITE

THERMOGUARD B

THERMOGUARD S

TIMONOX

TWINKLING STAR

VALENTINITE

WEISSPIESSGLANZ (GERMAN)

WHITE STAR

1.3 IDENTIFIERS

1.3.1 CAS REGISTRY NUMBER:

CAS 1309-64-4

1.3.2 NIOSH/RTECS NUMBER:

NIOSH/RTECS CC 5650000

1.3.3 UN/NA NUMBER:

9201 - Antimony trioxide

1.3.4 STCC NUMBER:

STCC 4966905

1.3.5 DESIGNATIONS:

C.I. 77052

NCI-c 55152

OHM/TADS NUMBER: 7217222

WISWESSER NOTATION: .SB2.O3

1.3.6 MOLECULAR FORMULA:

O3-Sb2

1.3.7 NAERG GUIDE NUMBER:

171 - SUBSTANCES (LOW TO MODERATE HAZARD)

1.4 DESCRIPTION

A. Antimony trioxide is obtained by heating concentrated antimony ore (primarily antimony trisulfide) and recondensing the fumes (Groth et al, 1986). It can also be produced by air oxidation of molten antimony metal (ACGIH,. 1986).

1.7 USES/FORMS/SOURCES

A. Antimony trioxide exists as odorless, white crystals, cubes or powder: It exists in the vapor phase as Sb4O6 (Budavari, 1989; Sax & Lewis, 1989; Sax & Lewis, 1987).

B. It is used in the manufacture of tartar emetic; as paint pigment; in enamels and glasses; as mordant; in flame-proofing of textiles, canvas, paper, and plastics (chiefly polyvinyl chloride); as ceramic opacifier; as a catalyst; as an intermediate; and in staining iron and copper (Budavari, 1989; Sax & Lewis, 1987).

3.0 CLINICAL EFFECTS

3.1 SUMMARY OF EXPOSURE

3.1.1 ACUTE EXPOSURE

A. The primary toxicity of antimony trioxide is pulmonary, but myocardial, liver, and kidney damage as well as mucous membrane irritation may be seen.

3.4 HEENT

3.4.2 EYES

A. CONJUNCTIVITIS was reported due to exposure to antimony trioxide dust (Dernehl et al, 1945).

B. Dose-related cataracts were produced in rats exposed by inhalation at concentrations up to 4.5 mg/m(3) for 12 months (Newton et al, 1994). This effect has not been seen in exposed humans.

3.5 CARDIOVASCULAR

3.5 CARDIOVASCULAR

3.5.3 ANIMAL STUDIES

A. CARDIOMYOPATHY

1. Myocardial damage and changes in coronary blood supply were noted in studies on animals who chronically inhaled air containing antimony trioxide (IRPTC, 1984).

3.6 RESPIRATORY

3.6.1 ACUTE EFFECTS

A. PNEUMOCONIOSIS

1. Antimoniosis is a pneumoconiosis seen after exposure to airborne dust of antimony trioxide. It is characterized by numerous small opacities of the pinhead type found in the middle and lower lung fields.

a. Lung changes develop after a minimum of 10 years of exposure (Potkonjak & Pavlovich, 1983). Diffuse pneumosclerosis has been reported in human workers who averaged 11.0 years of exposure (IRPTC, 1984).

3.6.3 ANIMAL STUDIES

A. PULMONARY FIBROSIS

1. Interstitial fibrosis has been seen in several studies done on rats exposed chronically to between 45 to 125 mg of Sb2O3/m(3) air for up to 14.5 months (Groth et al, 1986; Gross et al, 1955 a & b).

B. PNEUMONIA

1. An interstitial pneumonia was seen in animals chronically exposed to 190 mg/m(3). Rats exposed to 1700 mg of antimony trioxide/m(3) for 1 hour/day for 2 months over 1 year did not produce chronic pneumonitis and this compound was thought to be relatively inert (Stokinger et al, 1981).

3.8 GASTROINTESTINAL

3.8.1 ACUTE EFFECTS

A. GASTROENTERITIS

1. Should antimony trioxide be ingested, nausea or vomiting and diarrhea would be expected (IRPTC, 1984).

3.8.3 ANIMAL STUDIES

A. SPLEEN DISORDER

1. Hypertrophy of splenic follicles was seen in animals exposed to chronic daily concentrations of 45 mg/m(3) (Dernehl et al, 1945).

3.9 HEPATIC

3.9.3 ANIMAL STUDIES

A. LIVER FATTY

1. Fatty degeneration of the liver was seen in most animals exposed to chronic daily inhalation of 45 mg/m(3) of antimony trioxide (Dernehl et al, 1945).

3.13 HEMATOLOGIC

3.13.3 ANIMAL STUDIES

A. LEUKOPENIA

1. Eosinopenia as well as a decrease in white blood count and polymorphonuclear leucocytes were seen in animals exposed to chronic daily levels of 45 mg/m(3) (Dernehl et al, 1945).

B. ANEMIA

1. Animals dusted chronically with antimony trioxide (57 +/- 9 mg/m(3)) had decreased numbers of erythrocytes and amount of hemoglobin (IRPTC, 1984).

3.14 DERMATOLOGIC

3.14.1 ACUTE EFFECTS

A. RASH MACULO-PAPULAR

1. Antimony spots have been seen after industrial exposure. These spots are a rash consisting of papules and pustules surrounding sweat and sebaceous glands.

a. They are primarily found on forearms, thighs and areas where clothing is tight. It is more common in hot weather (Stokinger, 1981).

3.17 METABOLISM

3.17.3 ANIMAL STUDIES

A. CHOLINESTERASE DECREASED

1. Blood cholinesterase activity was seen to decrease in animals exposed to high levels of trivalent antimony (IRPTC, 1984).

3.21 CARCINOGENICITY

3.21.2 SUMMARY/HUMAN STUDIES

A. Some animal studies indicate that long term exposure to antimony trioxide is carcinogenic. Data on its carcinogenicity are conflicting and this is still being investigated.

3.21.3 SUMMARY/ANIMAL STUDIES

A. Antimony trioxide was not carcinogenic in rats by inhalation at doses as high as 4.5 mg/m(3) for 12 months (Newton et al, 1994).

3.21.4 HUMAN STUDIES

A. LACK OF INFORMATION

1. Data on whether antimony trioxide is a human carcinogen are conflicting and are still being investigated (ACGIH, 1986).

B. NEOPLASM

1. In a study done by Groth et al (1986) on rats exposed to antimony trioxide (TWA 45 mg/m(3)) for 7 hours/day, 5 days/week for 52 weeks, 27% of females had lung neoplasms.

a. Male rats did not develop the neoplasms. There was no significant difference in the incidence of other types of cancer between the exposed group and the controlled group.

3.21.5 ANIMAL STUDIES

A. LACK OF EFFECT

1. Antimony trioxide was not carcinogenic in Fischer 344 rats exposed to doses as high as 4.5 mg/m(3) for 12 months. Previous studies which reported antimony trioxide to be carcinogenic were carried out at higher lung burdens (Newton et al, 1994).

3.23 OTHER

3.23.1 ACUTE EFFECTS

A. OTHER NON-SPECIFIC

1. Animals treated with high doses of trivalent antimony showed a reduction of free SH in blood serum (IRPTC, 1984).

2. Antimony trioxide is often contaminated with arsenic. Air levels of arsenic at factory sites showed levels to range from 1 to 20 mcg/m(3) and averaged 5.6 mcg/m(3). However, it has been concluded that arsenic exists in antimony trioxide in a physically and toxicologically inert form (ACGIH, 1991).

4.0 MEDICAL SURVEILLANCE/LABORATORY

4.1 MONITORING PARAMETERS/LEVELS

4.1.1 SUMMARY

A. A urine assay can be used to confirm diagnosis. Levels of 1.0 mg/L may indicate a potentially harmful antimony exposure.

4.1.2 SERUM/BLOOD

A. HEMATOLOGIC

1. Monitor CBC for decreased white count and hemoglobin and hematocrit.

4.1.3 URINE

A. URINARY LEVELS

1. A urine assay can be used to confirm diagnosis. Levels of 1.0 mg/L may indicate a potentially harmful antimony exposure (Elkins, 1959).

4.3 METHODS

4.3 METHODS

A. SPECTROSCOPY/SPECTROMETRY

1. A spectrochemical method for analysis of antimony in biologic materials has been published by Kinser et al (1965). It has a lower limit of detection of 50 ppm in 2 mg of ash.

6.0 TREATMENT

6.1 LIFE SUPPORT

A. Support respiratory and cardiovascular function.

6.2 TREATMENT SUMMARY

A. Treatment is primarily supportive. Chelators such as BAL and unithiol have been used in some countries.

6.4 MONITORING

A. A urine assay can be used to confirm diagnosis. Levels of 1.0 mg/L may indicate a potentially harmful antimony exposure.

6.5 INHALATION EXPOSURE

6.5.1 DECONTAMINATION

A. DECONTAMINATION: Move patient from the toxic environment to fresh air. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis.

B. OBSERVATION: Carefully observe patients with inhalation exposure for the development of any systemic signs or symptoms and administer symptomatic treatment as necessary.

C. INITIAL TREATMENT: Administer 100% humidified supplemental oxygen with assisted ventilation as required. Exposed skin and eyes should be copiously flushed with water.

6.5.2 TREATMENT

A. OXYGEN

1. Administer 100 percent humidified supplemental oxygen with assisted ventilation as required to patients with respiratory tract irritation.

B. OTHER

1. If metal fume fever is suspected

Refer to "METAL FUME FEVER" management for further information.

6.6 DERMAL EXPOSURE

6.6.1 DECONTAMINATION

A. DERMAL DECONTAMINATION

1. Wash exposed area extremely thoroughly with soap and water. A physician may need to examine the area if

1. Wash exposed area extremely thoroughly with soap and water. A physician may need to examine the area if irritation or pain persists after washing.

6.7 EYE EXPOSURE

6.7.1 DECONTAMINATION

A. Exposed eyes should be irrigated with copious amounts of room temperature water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist after 15 minutes of irrigation, an ophthalmologic examination should be performed.

6.8 ORAL/PARENTERAL EXPOSURE

6.8.2 PREVENTION OF ABSORPTION

A. EMESIS

1. INDICATIONS/CAUTIONS

a. Measures to decrease absorption may be useful. The decision to induce or not to induce emesis in ingestion is often controversial, is not automatic, and must be carefully considered.

b. Emesis may be indicated in substantial recent ingestions. Contraindications to emesis induction include: signs of oral, pharyngeal, or esophageal irritation; a depressed gag reflex; or central nervous system excitation or depression. If these are present or likely, EMESIS SHOULD NOT BE INDUCED.

c. Emesis is most effective if initiated within 30 minutes of ingestion.

2. DOSE OF IPECAC SYRUP

a. ADULT OR CHILD OVER 90 TO 100 POUNDS (40 to 45 kilograms): 30 milliliters

b. CHILD 1 TO 12 YEARS: 15 milliliters

c. CHILD 6 TO 12 MONTHS (consider administration in a health care facility): 5 to 10 milliliters.

d. FLUIDS: After the dose is given, encourage clear fluids, 6 to 8 ounces in adults and 4 to 6 ounces in a child.

e. REPEAT DOSES: The dose may be repeated once if emesis does not occur within 30 minutes.

3. EMESIS FAILURE

a. If emesis is unsuccessful following 2 doses of ipecac, the decision to lavage or otherwise attempt to decontaminate the gut should be made on an individual basis. Two doses of ipecac pose little inherent toxicity.

4. Refer to the IPECAC/TREATMENT management in POISINDEX or MEDITEXT portion of TOMES or TOMES PLUS for further information on administration and adverse reactions.

B. ACTIVATED CHARCOAL/CATHARTIC

1. There are no reports of activated charcoal being used to adsorb to antimony salts. Since there is little risk in using activated charcoal, we recommend it until further data are available.

2. CHARCOAL ADMINISTRATION

a. Administer charcoal as slurry; charcoal slurry may be aqueous, or mixture of charcoal with saline cathartic or sorbitol.

3. CHARCOAL DOSE

a. The FDA suggests a minimum of 240 milliliters of diluent per 30 grams charcoal. Optimum dose of charcoal is not established; usual dose is 30 to 100 grams in adults and 15 to 30 grams in children; some suggest using 1 to 2 grams per kilogram as a rough guideline, particularly in infants (FDA, 1985).

4. CHARCOAL ADMINISTRATION/ADVERSE EFFECTS

a. Refer to the ACTIVATED CHARCOAL/TREATMENT management for further information on administration and adverse reactions.

5. CATHARTIC CONTRAINDICATIONS

a. Cathartics should not be used in patients who have an ileus. Saline cathartics should not be used in patients with impaired renal function (Gilman et al, 1990).

6. CATHARTIC ADMINISTRATION/CAUTIONS

a. Administer in a health care facility, especially in children.

b. Monitoring of fluids and electrolytes may be necessary in children.

c. The safety of more than one dose of a cathartic has not been established. Hypermagnesemia has been reported after repeated administration of magnesium containing cathartics in overdose patients with normal renal function (Smilkstein et al, 1988).

d. Repeated cathartic dosing should be done with extreme caution, if at all.

e. Administration of cathartics should be stopped when a charcoal stool appears.

7. CATHARTIC ADMINISTRATION

a. Administer ONE DOSE of a saline cathartic or sorbitol, mixed with charcoal or administered separately.

b. SALINE CATHARTIC/ADULT DOSE: 20 to 30 grams per dose of magnesium sulfate or sodium sulfate, OR magnesium citrate 4 milliliters per kilogram per dose up to 300 milliliters per dose, administered orally (Minocha et al, 1985).

c. SALINE CATHARTIC/PEDIATRIC DOSE: 250 milligrams per kilogram per dose of magnesium or sodium sulfate OR magnesium citrate 4 milliliters per kilogram per dose up to 300 milliliters per dose, administered orally (Minocha et al, 1985).

d. SALINE CATHARTIC ADMINISTRATION/ADVERSE EFFECTS: Refer to the LAXATIVE-SALINE or MAGNESIUM management for further information on administration and adverse effects.

e. SORBITOL/ADULT DOSE: 1 to 2 grams per kilogram per dose to a maximum of 150 grams per dose, administered orally (Minocha et al, 1985).

f. SORBITOL/PEDIATRIC DOSE: 1 to 1.5 grams per kilogram per dose as a 35 percent solution to a maximum of 50 grams per dose, administered orally to children over 1 year of age (Minocha et al, 1985).

g. SORBITOL ADMINISTRATION/ADVERSE EFFECTS: Refer to the SORBITOL management for further

g. SORBITOL ADMINISTRATION/ADVERSE EFFECTS: Refer to the SORBITOL management for further information on administration and adverse effects.

6.8.3 TREATMENT

A. CHELATION

1. BAL, given intramuscularly for 10 days has been recommended as treatment (Moeschlin, 1965).

2. Unithiol (not available in the U.S.) has been used experimentally (IRPTC, 1984; Reynolds, 1982).

a. Unithiol is a dimercaprol derivative.

b. Doses used are 1 milliliter of a 5 percent solution per 10 kilograms of patient's weight 3 to 4 times a day on day 1, 2 to 3 times on day two and 1 to 2 times on day 3 through 7.

c. The drug is given intramuscularly. Children 5 to 10 years old have been given 1/3 to 1/2 of the adult dose (IRPTC, 1984).

B. SYMPTOMATIC/SUPPORTIVE CARE

1. There is no other specific treatment; patients should be treated symptomatically.

7.0 RANGE OF TOXICITY

7.1 SUMMARY

A. Exposure to 0.5 to 5 mg/m(3) of dust and fumes in antimony plant resulted in only radiographic changes without systemic toxicity.

B. TLV (US) - None. USSR - 1 mg/m(3).

7.3 MINIMUM LETHAL EXPOSURE

A. GENERAL/SUMMARY

1. The minimum lethal human exposure to this agent has not been delineated.

7.4 MAXIMUM TOLERATED EXPOSURE

A. ROUTE OF EXPOSURE

1. Exposure to 0.5 to 5 milligrams/cubic meter of dust and fumes in an antimony plant (presumably primarily antimony trioxide) resulted in only radiographic changes without systemic toxicity (McCallum, 1963).

7.6 LD50/LC50

A. References: RTECS, 1992; Sax & Lewis, 1989

TCLo - (INHL) RAT: 4200 mcg/m(3) for 52W-I -- CAR

TC - (INHL) RAT: 4 mg/m(3) for 1Y-I -- ETA

TD - (INHL) RAT: 1600 mcg/m(3) for 52W-I -- NEO

LD - (SC) MAMMAL: > 120 mg/kg

LDLo - (SC) RABBIT: 2500 mcg/kg

LDLo - (IV) DOG: 3 mg/kg

LD50 - (ORAL) RAT: > 20 g/kg

LD50 - (IP) RAT: 3250 mg/kg

LD50 - (IP) MOUSE: 172 mg/kg

8.0 KINETICS

8.1 ABSORPTION

A. SUMMARY

1. Antimony is absorbed both from the gastrointestinal tract and through the lungs.

8.2 DISTRIBUTION

8.2.1 DISTRIBUTION SITES

A. TISSUE/FLUID SITES

1. Antimony is readily detected in blood, liver, lungs, kidneys, thyroid, adrenals and pancreas. Distribution pathways are similar regardless of route of entry; only the rates of disposition vary (IRPTC, 1984).

2. The highest concentrations are found in the thyroid, adrenals, liver and kidneys (Friberg, 1979).

8.4 EXCRETION

8.4.1 KIDNEY

A. Antimony can be identified in the urine soon after administration (IRPTC, 1984).

B. Urinary excretion appears to be greater for pentavalent antimony than for trivalent compounds (Friberg, 1979).

8.4.2 FECES

A. Fecal excretion is 2 to 3 times greater than urinary excretion (IRPTC, 1984). Gastrointestinal excretion is greater for trivalent than for pentavalent antimony (Friberg, 1979).

9.0 PHARMACOLOGY/TOXICOLOGY

9.2 TOXICOLOGIC MECHANISM

A. The lungs of animals exposed to 45 mg/m(3) TWA for 8 hours per day, 5 days per week for 52 weeks showed confluent, white and yellow foci on the plural surfaces of all lobes of the lungs. Interstitial fibrosis was also seen. Neoplasms were found (Groth et al, 1986).

10.0 STANDARDS/LABELS

10.1 STANDARDS

10.1.1 WORKPLACE STANDARDS

A. ACGIH-TLV: Listed (as Antimony trioxide production) (ACGIH, 1997)

1. no TWA; no STEL

2. Skin Notation: Not Listed

3. A2-suspected human carcinogen

B. OSHA PEL: Not Listed (OSHA, 1996a)

C. OSHA List of Highly Hazardous Chemicals, Toxics and Reactives: Not Listed (OSHA, 1996)

D. NIOSH VALUES: (NIOSH, 1996)

1. REL: Not Listed

2. IDLH VALUE: Not Listed

E. AIHA WEEL VALUE: Not Listed (AIHA, 1996)

10.1.2 ENVIRONMENTAL STANDARDS

A. SARA TITLE III

1. EHS (EXTREMELY HAZARDOUS SUBSTANCES) LIST: Not Listed (EPA, 1996f)

2. SECTION 313: Not Listed (EPA, 1996g)

B. CERCLA; HAZARDOUS SUBSTANCES and REPORTABLE QUANTITIES: Listed (EPA, 1996e)

1. Statutory RQ (Reportable Quantity):

a. 5000 pounds

b. Codes: Listed

(1) 1 - Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA Section 311(b)4.

2. Final RQ (Reportable Quantity):

a. 1000 pounds (454 kilograms)

b. Notes: Not Listed

c. Final RQ Category: C

C. RCRA HAZARDOUS WASTE NUMBER: Not Listed (EPA, 1996; EPA, 1996a; EPA, 1996b; EPA, 1996c; EPA, 1996d)

D. TSCA INVENTORY: Listed (LOLI, 1996)

E. AIHA ERPG VALUES: Not Listed (AIHA, 1996)

F. DOT List of Marine Pollutants: Not Listed (DOT, 1996a)

11.0 PHYSICOCHEMICAL

11.1 PHYSICAL PARAMETERS

11.1.1 PHYSICAL CHARACTERISTICS

A. Antimony trioxide is a white, odorless, solid (ACGIH, 1986).

B. It exists as odorless, white crystals, cubes or powder (Budavari, 1989; Sax & Lewis, 1989; Sax & Lewis, 1987).

11.1.2 MOLECULAR WEIGHT

A. 291.52 (Budavari, 1989)

11.1.4 DENSITY

A. SOLID: 5.67 g/cm(3) (NL-TP) (Sax & Lewis, 1987)

KEY

NL-TP: Not Listed, Temperature and Pressure

NTP: Normal Temperature and Pressure

(25 degrees C; 77 degrees F and 760 mmHg) OTHER-TP: Other, Temperature and Pressure

STP: Standard Temperature and Pressure

(0 degrees C; 32 degrees F and 760 mmHg)

11.2 CHEMICAL PARAMETERS

11.2.1 PH

A. Antimony trioxide is amphoteric (Sax & Lewis, 1987).

11.2.2 REACTIVITY

A. When heated to decomposition, antimony trioxide emits toxic antimony fumes (Sax & Lewis, 1989).

B. Antimony trioxide is incompatible with chlorinated rubber and heat of 216 degrees C; and bromine trifluoride (Sax & Lewis, 1989).

C. Antimony trioxide (powder) ignites on heating in air (Bretherick, 1990).

11.2.3 SOLUBILITY

A. SOLUBILITY IN WATER

A. SOLUBILITY IN WATER

1. slightly soluble in water (Budavari, 1989)

B. SOLUBILITY, OTHER

1. Slightly soluble in dilute H2SO4 or dilute HNO3 (Budavari, 1989).

2. Solubility in dilute HCl (0.1 moles HCl/kg H2O): approximately 1x10(-4) g-atoms Sb/kg H2O. Solubility increases with increasing HCl concentration (Budavari, 1989).

3. Soluble in solutions of alkali hydroxides or sulfides, and in warm solution of tartaric acid or of bitartrates (Budavari, 1989).

12.0 REFERENCES

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12.3 CONSULTANTS

A. CHEMTREC

1. The above information is generic for the compound. For further product specific information, consult manufacturer. In an emergency, contact CHEMTREC at 1-800-424-9300 or 703-527-3887 if outside the continental U.S.

2. Immediately notify the National Response Center (1-800-424-8802) if a release of a reportable quantity of a hazardous substance to the environment has occurred.

B. EPA ENVIRONMENTAL RESPONSE TEAM

1 In case of a large spill or release, notify appropriate local pollution, fire, and emergency response authorities. Seek 24-hour professional environmental engineering assistance through the EPA's Environmental Response Team (ERT), Edison, New Jersey (201) 321-6660.

13.0 AUTHOR INFORMATION

13.1 CONTRIBUTOR(S) TO THIS DOCUMENT

A. Written by: David G Spoerke, MS, RPh, 07/87

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Ken Kulig, MD, 09/87

Alan H Hall, MD, 06/97

C. In addition to standard revisions of this management, certain portions were updated with recent literature: 09/95

D. Specialty Board: Industrial

Refer to the TOMES EDITORIAL BOARD section for more information.

(TM0634)

New Jersey Hazardous Substance Fact Sheet

ANTIMONY TRIOXIDE

Common Name: **ANTIMONY TRIOXIDE**

CAS Number: 1309-64-4
DOT Number: NA 9201

RTK Substance number: 0149
Date: August 1987

HAZARD SUMMARY

- **Antimony Trioxide** can affect you when breathed in and by passing through your skin.
- There is an association between **Antimony Trioxide** production and increased lung cancer.
- Exposure can cause sore throat, rash, poor appetite and irritation of the airways, with cough.
- High or repeated exposure may damage the liver and the heart muscle.
- If used near acid, a deadly gas (Stibine) can be released. CONSULT THE NJ DOH FACT SHEET ON STIBINE.

IDENTIFICATION

Antimony Trioxide is a white, odorless crystal (sugar or sand-like) powder. It is used in flame-proofing, pigments and ceramics, to stain iron and copper, and to decolorize glass.

REASON FOR CITATION

- **Antimony Trioxide** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, NIOSH and DOT.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

These exposure limits are recommended for Antimony and compounds as Stibine.

These exposure limits are recommended for Antimony and compounds as Stibine.

OSHA: The legal airborne permissible exposure limit (PEL) is 0.5 mg/m ^{3} averaged over an 8-hour workshift.
NIOSH: The recommended airborne exposure limit is 0.5 mg/m ^{3} averaged over a 10-hour workshift.
ACGIH: The recommended airborne exposure limit is 0.5 mg/m ^{3} averaged over an 8-hour workshift.

- The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
- Since exposure to **Antimony Trioxide** or its production may cause cancer, all contact with this chemical should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

- Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- Wear protective work clothing.
- Wash thoroughly immediately after exposure to **Antimony Trioxide** and at the end of the workshift.
- Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Antimony Trioxide** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Antimony Trioxide**:

- Exposure can cause sore throat and airway irritation with cough. Nausea and metallic taste may occur. Higher levels may cause the heart to beat irregularly and may cause fluid in the lungs (pulmonary edema). This can cause death.
- Contact can irritate and may burn eyes or skin.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Antimony Trioxide** and can last for months or years:

Cancer Hazard

- There is evidence that there is an association between the production of **Antimony Trioxide** in smelting processes and an increase of lung cancer among exposed individuals.
- **Antimony Trioxide** may be a CARCINOGEN in humans since it has been shown to cause lung and liver cancer in animals.

- liver cancer in animals.
- Many scientists believe there is no safe level of exposure to a carcinogen. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard

- There is some evidence that **Antimony Trioxide** may damage the developing fetus and cause miscarriages.

Other Long-Term Effects

- Repeated exposure can cause headaches, poor appetite, dry throat and lack of sleep. Damage to the liver and heart muscle may also occur, especially with frequent or higher exposures.
- Very irritating substances may affect the lungs. It is not known whether **Antimony Trioxide** causes lung damage.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- Urine test for Antimony.
- Consider lung function tests.

If symptoms develop or overexposure is suspected, the following may be useful:

- Consider chest x-ray after acute overexposure.
- EKG.
- Liver function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

- Use of **Antimony Trioxide** near acid can cause release of a deadly gas, Stibine. CONSULT THE NJ DOH FACT SHEET ON STIBINE.
- Because smoking can cause heart disease, as well as lung cancer, emphysema and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- Where possible, automatically transfer **Antimony Trioxide** from drums or other storage containers to process containers.
- Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: Antimony #78-216.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- Workers whose clothing has been contaminated by **Antimony Trioxide** should change into clean clothing promptly.
- Do not take contaminated work clothes home. Family members could be exposed.
- Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Antimony Trioxide**.
- If there is the possibility of skin exposure, emergency shower facilities should be provided.
- On skin contact with **Antimony Trioxide**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Antimony Trioxide**, whether or not known skin contact has occurred.
- Do not eat, smoke, or drink where **Antimony Trioxide** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
- Use a vacuum or a wet method to reduce dust during clean-up. Do not dry sweep.
- When vacuuming, a high efficiency particulate absolute (HEPA) filter should be used, not a standard shop vacuum.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- Avoid skin contact with **Antimony Trioxide**. Wear protective gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day and put

- All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day and put on before work.

Eye Protection

- Wear dust-proof goggles and face shield when working with powders or dust, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- Where the potential exists for exposures over 0.5 mg/m^3, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
- Exposure to 80 mg/m^3 is immediately dangerous to life and health. If the possibility of exposures above 80 mg/m^3 exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?
A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health
Occupational Health Service
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>EMERGENCY INFORMATION<<<<<<<<<

Common Name: **ANTIMONY TRIOXIDE**
DOT Number: NA 9201
DOT Emergency Guide code: 31
CAS Number: 1309-64-4

NJ DOH Hazard rating	
FLAMMABILITY	1
REACTIVITY	Not Found
COMBUSTIBLE SOLID POISONOUS GAS IS PRODUCED IN FIRE	

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

- **Antimony Trioxide** is a combustible solid.
- Use dry chemical, CO2, water spray, or foam extinguishers.
- POISONOUS GAS IS PRODUCED IN FIRE.
- If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Antimony Trioxide** is spilled, take the following steps:

- Restrict persons not wearing protective equipment from area of spill until clean-up is complete.
- Remove all ignition sources.
- Ventilate area of spill .
- Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- It may be necessary to contain and dispose of **Antimony Trioxide** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172
Other:

HANDLING AND STORAGE

- Prior to working with **Antimony Trioxide** you should be trained on its proper handling and storage.
- **Antimony Trioxide** must be stored to avoid contact with BROMINE TRIFLUORIDE since violent reactions occur. Store away from acids. Contact with acids will produce deadly Stibine gas.
- Store in tightly closed containers in a cool, well-ventilated area away from HEAT.
- Sources of ignition, such as smoking and open flames, are prohibited where **Antimony Trioxide** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253
Other:

Eye Contact

- Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

- Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing

- Remove the person from exposure.
- Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- Transfer promptly to a medical facility.
- Medical observation for 1 to 2 days after overexposure is recommended, as some effects may delayed.

PHYSICAL DATA

Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Antimony Oxide (Sb_2O_3)

Other Names and Formulations:
Antimonious Oxide; Antimony White; Antimony Peroxide; Antimony Sesquioxide

NEW JERSEY DEPARTMENT OF HEALTH
Right to Know Program
CN 368, Trenton, NJ 08625-0368
(609) 984-2202

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* File name:                               Server: PS-EID-B36-HP5              *
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ANTIMONY TRIOXIDE

OHM/TADS - Oil and Hazardous Materials/Technical Assistance Data System

SUBSTANCES INCLUDED

Material name: ANTIMONY TRIOXIDE
Note: Listed in CERCLA ("Superfund" Act)
Synonyms: DIANTIMONY TRIOXIDE FLOWERS OF ANTIMONY SENARMONTITE VALENTINITE EXITELITE WEISSPIESSGLANZ ANTIMONY WHITE ANTIMONY OXIDE
CAS number: 1309-64-4
Chemical formula: SB2O3
SIC CODE: 2850; 2260
Tradename(s):
Production sites: AMERICAN CAN CO., M&T CHEMS. INC. SUBSID., BALTIMORE, MD. CHEMETRON CORP., INORGANIC AND METAL TREATING CHEMS. DIV;, CLEVELAND, OHIO KEWANEE OIL CO., HARSHAW CHEM. CO. DIV., INDUST. CHEMS. DEPT., GLOUCESTER CITY, NJ; RICHARDSON-MERRELL, INC., J.T. BAKER CHEM. CO. SUBSID., PHILLIPSBURG, N.J. NYANZA INC., ASHLAND, MA. PPG INDUSTRIES, INC., CHEMICALS GROUP, SPECIALITY PRODUCTS UNIT, 12555 W. HIGGINS RD., P.O. BOX 66251-AMF OhARE, CHICAGO, IL 60666, (312) 694-2700
Species in mixture: TWO CRYSTALLINE FORMS BASED ON PARTICLE SIZE ARE SENARMONTITE (95% OF YIELD IN PROCESS) AND ORTHORHOMBIC VALENTINITE. FIRE SHIELD (BRANDI) FROM PPG COMES IN 3 FORMS: L GRADE 99.3%, 2.5 TO 3.5 MICRON PARTICLES; H GRADE 99.3%, 1.0 TO 1.8 MICRON PARTICLES; AND ULTRAFINE 99.3% .25 MICRON PARTICLES WITH IMPURITITES OF ARSENIC (<.5%), LEAD (.07%), IRON (.002%), AND SO4 (.015%). (SBO3** 79/PPG)

COMMON USES

REFINING AND COLORING OF GLASS; FLAME RETARDANT; GLASS-TO-GLASS AND GLASS-TO-METAL BONDS; SEMI-CONDUCTING CERAMICS AND GLAZES; INDUSTRIAL ESTERIFICATION CATALYST; PIGMENT WHITE 11; ALSO COLOR STABILIZER OR MIXER FOR OTHER PIGMENTS; PAPER COATINGS FOR X-RAY LUMINESCENCE; SYNERGISTIC WITH MOLYBDENUM DISULFIDE FOR SOLID FILM LUBRICANTS (SBO3** 79/PPG)

TRANSPORT/STORAGE/HANDLING

Transport:
Rail(%): 81.0
Barge(%): 3.0
Truck(%): 16.0
Storage:
General storage procedures: STORE IN COOL, WELL-VENTILATED PLACE (RMRNR* 12,73/OTT)
Handling:
General handling procedures: NOT CLASSIFIED BY DOT AS HAZARDOUS. (RMRNR* 12,73/OTT) RECOMMENDED USE ONLY WITH IMPERVIOUS LONG GAUNTLET GLOVES, CHEMICAL SAFETY GLASSES, DUST MASKS, AND APRONS. (RMRNR* 12,73/OTT)

LABORATORY

Field detection limits (ppm): .1, COLORIMETRIC, (BNW 70098)
Laboratory detection limits (ppm): .1, COLORIMETRIC, (BNW 70096)

PHYSICOCHEMICAL PARAMETERS

Physical parameters:

Location/state of material: COLORLESS, ORTHORHOMBIC, DELIQUESCENT CRYSTALS. SOLID WILL SINK AND DISSOLVE VERY SLOWLY.
Color in water: COLORLESS
Melting point (degrees C): 656
Melting characteristics: SAX*** 79/SAX
Boiling point (degrees C): 1425; 1550
Boiling characteristics: ITII** 80; SUBLIMES (SAX*** 79/SAX)
Specific gravity: 5.2 (SENARMONTITE); 5.67 (VALENTINITE) (SBO3** 79/PPG)
Vapor pressure (mm Hg): 1; 6
Vapor pressure text: 1 MM HG AT 574 DEGREES CELSIUS (SAX*** 79/SAX); 6 MM HG AT 666 DEGREES CELSIUS.

Chemical parameters:

Reactivity:
Binary reactants: SB2O3 HEATED IN AIR IGNITES AND BURNS. BRF8 AND SB2O3 REACT VIOLENTLY. (NFC*** 13,80/NFPA) REACTS WITH ORGANIC ACIDS, ALCOHOLS, GLYCOLS, .ALPHA.-HYDROXY ACIDS, .ORTHO.-DIHYDRIC PHENOLS, SUGAR ALCOHOLS, AND OTHER POLY HYDROXY COMPOUNDS. IT HAS CATALYTIC EFFECT ON ESTERIFICATION REACTIONS. WHEN FUNCTIONING AS A FLAME RETARDANT IT UNDERGOES REACTIONS WITH HYDROGEN HALIDES GENERATED BY THERMAL DECOMPOSITION OF HALOGENATED ORGANIC COMPOUNDS.
Water chemistry: SEE FILE ON ANTIMONY FOR SOLUTION CHEMISTRY.

FIRE/EXPLOSION/CORROSION HAZARDS

Fire hazard:
Flammability: NONFLAMMABLE
Standard codes: EPA 311; IMCO CODES NOT APPLICABLE FOR ANTIMONY OXIDES AND SULFIDES. (SBLIT* 76/ADL) SUPERFUND DESIGNATED (HAZARDOUS SUBSTANCES) LIST
Toxic combustion products: SB FUMES - WEAR SELF-CONTAINED BREATHING APPARATUS.
Personnel protection: IMPERVIOUS LONG GAUNTLET GLOVES, CHEMICAL SAFETY GOGGLES, APRONS AND FILTER-TYPE DUST RESPIRATOR (WHEN EXPOSURE EXCEEDS OSHA LIMITS). (SBO3** 79/PPG) SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. (ERG*** 80/DOT)
Explosion hazard:
Explosiveness: STABLE

ENVIRONMENTAL HAZARDS

Pollution hazard:

Water pollution:
Effect on water treatment process: WILL ADD GREATLY TO SLUDGE VOLUME
Water uses threatened: POTABLE SUPPLY, FISHERIES.
Air pollution: LITTLE AIR POLLUTION THREAT ON A SHORT-TERM BASIS.
Food chain:
Potential for accumulation: SB CAN BE CONCENTRATED 300 TIMES BY MARINE LIFE. POSITIVE, SB CONCENTRATION FACTORS - FRESHWATER AND MARINE INVERTEBRATES 16,000; AND FISH 40 . HALF-LIFE IN TOTAL HUMAN BODY 38 DAYS .
Food chain concentration: POSITIVE

Aquatic toxicity:

Freshwater toxicity text (Conc. in ppm):

Conc.	Expos (Hr)	Specie	Effect	Test Environment
> 80	96	FATHEAD MINNOW	TLM	HARD OR SOFT AS SB

Toxicity to animals:

Animal toxicity text (Value in mg of material/kg body wt):

Value	Time	Species	Param.	Route
SEE RTECS				

RANGE OF TOXICITY

Inhalation limit: .5

Inhalation limit text: MG/CU M AS SB.

Direct contact: NO IRRITATION TO CONJUNCTIVA OR CORNEA IN EYES OF RABBITS UP TO 7D AFTER INSTILLATION OF 1.3 +/- 1.65 MICRON-SIZE PARTICLES. NO LOCAL OR SYSTEMIC EFFECTS WHEN APPLIED AS AN AQUEOUS PASTE TO DENUDED RABBIT SKIN OVER TWO-THIRDS OF TORSO, COVERED WITH IMPERVIOUS MEMBRANE, AND ALLOWED TO REMAIN IN SKIN CONTACT FOR 1 WEEK. DRY POWDER PACKED INTO SHAVED RABBIT BACKS DELAYED HEALING (SBLIT* 76/ADL) ANTIMONY TRIOXIDE HAS BEE KNOWN TO CAUSE "ANTIMONY SPOTS", A DERMATITIS RESULTING FROM EXPOSURE OF THE SKIN, MOISTENED BY SWEAT AND HUMIDITY, TO ANTIMONY DUSTS. RESULTS IN INTENST ITCHING AND SKIN ERUPTIONS. ANTIMONY COMPOUNDS ARE GENERALLY LESS TOXIC THAN ANTIMONY SO SOME TOXIC SYMPTOMS ARE REALLY DUE TO THE PRESENCE OF FREE ANTIMONY. (OCDIS* 77/KEY)

General sensation: ODORLESS, TASTELESS. EFFECTS APPEAR TO BE REVERSIBLE.

Direct human ingestion (mg/kgwt): 70

HUMAN HEALTH HAZARDS

Acute hazard level: SB2O3 IS RELATIVELY HARMLESS WHEN INGESTED. FOR EXAMPLE, A ONE-TIME ORAL DOSE OF 16 G CAUSED NO ILL EFFECTS IN RATS WITHIN A 30-D OBSERVATION PERIOD. GROSS ET AL., 1955A, CITED IN (SBLIT* 76/ADL) PROBABLY ALSO RELATIVELY HARMLESS A BRIEF INHALATION PERIOD. FOR EXAMPLE, HAMSTERS AND RATS EXPOSED TO 900 OR 1,200 MG SB2O3 PER CU M FOR 12 H SHOWED ONLYAN INCREASE IN NUMBER OF LUNG MACROPHAGES. GROSS ET AL., 1969, CITED IN (SBLIT* 76/ADL)

Chronic hazard level: MARINE WATERS SHOULD NOT EXCEED 1/50 OF 96-H LC50 (.2 PPM). UNDISSOLVED PORTION WILL PROVIDE CONTINUING SOURCE OF SB TO WATER. DAILY DOSES OF .15 TO 4 MG PER RABBIT OR RAT PER DAY HAD NO EFFECTS. FLURY, 1927, CITED IN (INDTO* 61/BRO) CHRONIC INHALATION EXPOSURES AT 89 TO 1,700 MG/CU M WITH RATS AND RABBITS FOR UP TO 14.5 MO SHOWED PHAGOCYTIC RESPONSE WITHOUT APPRECIABLE CHRONIC PNEUMONITIS; MILD HYPERPLASIA IN TRACHEOBRONCHIAL LYMPH NODES; LUNG DEPOSITS OF ANTIMONY, FIBROSIS; AND , IN ONE SERIES OF EXPERIMENTS, 18-85% DEATHS DUE TO PNEUMONIA WITH PRECEDING PNEUMONITIS. (NIOSB* 78/ANO) THE DEATHS WERE SEEN WHEN THE EXPOSURES WERE AS LONG AS 25 H/WEEK. OCCUPATIONAL EXPOSURE TO ANTIMONY TRIOXIDE (AND FREQUENTLY ORES AND SMELTER PRODUCTS CONTAINING OTHER HEAVY METAL CONTAMINANTS) IS ASSOCIATED WITH PNEUMOCONIOSIS, POSSIBLE INCREASED RISK OF LUNG CANCER, MILD DERMATITIS, AND SLIGHT ANISOCYTOSIS. THERE IS REPORT BY LINCK ET AL., (1976) OF A NO-OBSERVED EFFECT IN WORKERS EXPOSED TO ANTIMONY TRIOXIDE AT LEVELS SIMILAR TO THOSE REPORTED TO PRODUCE PNEUMOCONIOSISIN ANOTHER STURDY. (NIOSB* 78/ANO)

Public health hazard: MINIMAL HAZARD TO PUBLIC HEALTH IF ONLY A SHORT-TERM EXPOSURE TO THE DUSTS.

Action levels: IF INTENSE HEAT OR FLAME PREVAIL, NOTIFY AIR AUTHORITY.

Teratogenicity: NOT TERATOGENIC BUT TOXIC TO REPRODUCTIVE FUNCTION: FEMALE RATS EXPOSED TO 250 MG SB2O3 DUST PER CU M FOR 4H/D FOR 1.5 TO 2 MO. SHOWED REDUCED FECUNDITY AND REDUCED NUMBERS OF VIABLE OFFSPRING. BELYAEVA, 1967, CITED IN (NIOSB* 78/ANO)

CLEANUP PROCEDURES

In situ amelioration: OXIDE IS ONLY SLIGHTLY SOLUBLE, SOLUBILITY GOES DOWN AS PH RISES. DREDGE SOLIDS FROM BOTTOM. MAY BE ADVISABLE TO RAISE PH WITH LIME. ANTIMONY OXIDE SPILLS SHOULD BE VACUUMED AWAY AND DISPOSED OF IN AN APPROVED HAZARDOUS WASTE FACILITY. (SBO3** 79/PPG) SEEK PROFESSIONAL ENVIRONMENTAL ENGINEERING ASSISTANCE THROUGH EPA'S ENVIRONMENTAL RESPONSE TEAM (ERT), EDISON, NJ, 24-HOUR NO. 201-321-6660.
Countermeasure material availability: LIME - CEMENT PLANTS.
Disposal method(s): SB2O3 CAN BE DISCARDED IN MUNICIPAL SYSTEMS. IT IS NOT CONSIDERED TO BE A POLLUTION PROBLEM. (ENVTAR 13(8)18,71/SCH) (ESTHAG 5(5)436,71/MUR) THE PRECIPITATE, DRY, PACKAGE AND SHIP TO THE SUPPLIER OR IF THE WASTE IS OF VERY LITTLE VALUE, USE PROCEDURE 11.

DATA ADEQUACY EVALUATION

FAIR

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**********************************************************************
* User name:   slm8 (113)                  Queue:  FNIO-SDT-TAFT/PQ-EID-B36    *
* File name:                               Server: PS-EID-B36-HP5              *
* Directory:                                                                   *
* Description:  Antimony oxide - RTECS - Regis                                 *
*              May 20, 1998                          1:42pm                    *
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*                                                                              *
*                                  ll          888                             *
*                                   l         8   8                            *
*                            ssss   l   mm m  8   8                            *
*                           s       l   m m m  888                             *
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*                                                                              *
*         PPPP   QQQ        EEEEE  III  DDDD        BBBB  33333   66          *
*         P   P Q   Q       E       I   D   D       B   B    3   6            *
*         P   P Q   Q       E       I   D   D       B   B   3   6             *
*         PPPP  Q   Q ----- EEEE    I   D   D ----- BBBB     3  6666          *
*         P     Q Q Q       E       I   D   D       B   B     3 6   6         *
*         P     Q  Q        E       I   D   D       B   B 3   3 6   6         *
*         P      QQ Q       EEEEE  III  DDDD        BBBB   333   666         *
*                                                                              *
*                                                                              *
*                                                                              *
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Antimony oxide

RTECS - Registry of Toxic Effects of Chemical Substances

1.0 SUBSTANCE IDENTIFICATION

RTECS Number: CC5650000
Chemical Name: Antimony oxide
CAS Number: 1309-64-4
Molecular Formula: O3-Sb2
Molecular Weight: 291.50
Wiswesser Notation: .SB2.O3
Substance Investigated as: Tumorigen, Mutagen, Primary Irritant, Reproductive Effector
Last Revision Date: 1997

2.0 SYNONYM(S)/TRADENAME(S)

1 A 1582
2 A 1588LP
3 Amspec-KR
4 Antimonious oxide
5 Antimony sesquioxide
6 Antimony trioxide
7 Antimony trioxide production (ACGIH)
8 Antimony White
9 Antimony(3+) oxide
10 Antox
11 AP 50
12 AT 3 AT 3 (fireproofing agent) Atox F Atox S
13 C.I. 77052
14 C.I. Pigment White 11
15 Chemetron fire shield
16 Dechlorane A-O
17 Diantimony trioxide
18 Exitelite
19 Fireshield FSPO 405
20 Flowers of antimony
21 NCI-C55152
22 Nyacol A 1510LP
23 Nyacol A 1530
24 Patox C
25 Patox H
26 Patox L
27 Patox M
28 Patox S
29 Stibiox MS
30 Thermoguard B
31 Thermoguard L
32 Thermoguard S
33 Timonox
34 Timonox White Star
35 Twinkling star
36 Weisspiessglanz (German)

35
36 Weisspiessglanz (German)
37 White star

3.0 HEALTH HAZARD DATA

ACUTE TOXICITY

LDLO/LCLO - LOWEST PUBLISHED LETHAL DOSE/CONC

Rabbit

LDLo - ROUTE: Subcutaneous; **DOSE:** 2500 ug/kg *CODEN: HBAMAK Bibliographic Data: "Abdernalden's Handbuch der Biologischen Arbeitsmethoden." (Leipzig, Ger. Dem. Rep.) CODEN Reference: 4:1289,1935*

LDLo - ROUTE: Skin; **DOSE:** 2 gm/kg *CODEN: NTIS** Bibliographic Data: National Technical Information Service. (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information. CODEN Reference: OTS0555447*

Dog

LDLo - ROUTE: Intravenous; **DOSE:** 3 mg/kg *CODEN: HBAMAK Bibliographic Data: "Abdernalden's Handbuch der Biologischen Arbeitsmethoden." (Leipzig, Ger. Dem. Rep.) CODEN Reference: 4:1289,1935*

LD50/LC50 - LETHAL DOSE/CONC 50% KILL

Rat

LD50 - ROUTE: Intraperitoneal; **DOSE:** 3250 mg/kg *CODEN: EQSSDX Bibliographic Data: Environmental Quality and Safety, Supplement. (Stuttgart, Fed. Rep. Ger.) V.1-5, 1975-76. Discontinued. CODEN Reference: 1:1,1975*

LD50 - ROUTE: Oral; **DOSE:** >34600 mg/kg *CODEN: NTIS** Bibliographic Data: National Technical Information Service. (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information. CODEN Reference: OTS0555447*

TOXIC EFFECTS:

Behavioral - Somnolence (general depressed activity)

Skin and Appendages - Hair

LD50 - ROUTE: Subcutaneous; **DOSE:** 7904 mg/kg *CODEN: GISAAA Bibliographic Data: Gigiena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936- CODEN Reference: 38(1):99,1973*

Mouse

LD50 - ROUTE: Intraperitoneal; **DOSE:** 172 mg/kg *CODEN: 85GMAT Bibliographic Data: "Toxicometric Parameters of Industrial Toxic Chemicals Under Single Exposure," Izmerov, N.F., et al., Moscow, Centre of International Projects, GKNT, 1982 CODEN Reference: -,23,1982*

OTHER LD/LC - OTHER LETHAL DOSE/CONC

Mammal - Unspecified Species

LD - ROUTE: Subcutaneous; **DOSE:** >120 mg/kg *CODEN: GTPZAB Bibliographic Data: Gigiena Truda i Professional'nye Zabolevaniya. Labor Hygiene and Occupational Diseases. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1-36, 1957-1992. For publisher information, see MTPEEI CODEN Reference: 8(7):25,1964*

IRRITATION

EYE - STANDARD DRAIZE TEST

Rabbit

ROUTE: Eyes; **DOSE:** 100 mg; **REACTION:** Mild *CODEN: NTIS** Bibliographic Data: National Technical Information Service. (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information. CODEN Reference: OTS0555447*

REPRODUCTIVE EFFECTS

Rat

ROUTE: Inhalation; **DOSE:** 82 ug/m3; **DURATION:** female 1-21D of pregnancy
CODEN: GISAAA Bibliographic Data: Gigiena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936- CODEN Reference: 52(10):85,1987
TOXIC EFFECTS:
Effects on Fertility - Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea)
Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)
ROUTE: Inhalation; **DOSE:** 270 ug/m3; **DURATION:** female 1-21D of pregnancy
CODEN: GISAAA Bibliographic Data: Gigiena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936- CODEN Reference: 52(10):85,1987
TOXIC EFFECTS:
Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)
Effects on Embryo or Fetus - Fetal death
ROUTE: Inhalation; **DOSE:** 270 ug/m3/24H; **DURATION:** female 1-21D of pregnancy
CODEN: GISAAA Bibliographic Data: Gigiena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936- CODEN Reference: 54(4):68,1989
TOXIC EFFECTS:
Effects on Fertility - Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea)
Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)
Effects on Embryo or Fetus - Fetal death
ROUTE: Intratesticular; **DOSE:** 23320 ug/kg; **DURATION:** male 1D prior to mating
CODEN: JRPFA4 Bibliographic Data: Journal of Reproduction and Fertility. (Biochemical Soc. Book Depot, POB 32, Commerce Way, Colchester, Essex CO2 8HP, UK) V.1- 1960- CODEN Reference: 7:21,1964
TOXIC EFFECTS:
Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)
Paternal Effects - Testes, epididymis, sperm duct

GENETIC EFFECTS

DNA REPAIR

Bacteria - B Subtilis

DOSE: 50 mmol/L *CODEN: MUREAV Bibliographic Data: Mutation Research. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964- CODEN Reference: 77:109,1980*

SISTER CHROMATID EXCHANGE

Hamster

CELL TYPE: lung; **DOSE:** 90 ug/L *CODEN: MUREAV Bibliographic Data: Mutation Research. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964- CODEN Reference: 264:163,1991*

TUMORIGENIC EFFECTS

Rat

ROUTE: Inhalation; **DOSE:** 4 mg/m3/1Y intermittent *CODEN: PESTC* Bibliographic Data: Pesticide & Toxic Chemical News. (Food Chemical News, Inc., 400 Wyatt Bldg., 777 14th St., NW, Washington, DC 20005) V.1- 1972- CODEN Reference: 8:16,1980*
TOXIC EFFECTS:
Tumorigenic - Equivocal tumorigenic agent by RTECS criteria
Lung, Thorax, or Respiration - Tumors
Liver - Tumors
ROUTE: Inhalation; **DOSE:** 1600 ug/m3/52W intermittent *CODEN: AIHAM* Bibliographic Data: Annual Meeting of American Industrial Hygiene Association. (Akron, OH) For publisher information, see AIHAAP. CODEN Reference: 20:1,1980*
TOXIC EFFECTS:
Tumorigenic - Neoplastic by RTECS criteria
Liver - Tumors
Skin and Appendages - Tumors
ROUTE: Inhalation; **DOSE:** 50 mg/m3/7H/52W intermittent *CODEN: JTEHD6 Bibliographic Data: Journal of Toxicology and Environmental Health. (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005) V.1- 1975/76- CODEN Reference: 18:607,1986*
TOXIC EFFECTS:
Tumorigenic - Carcinogenic by RTECS criteria
Lung, Thorax, or Respiration - Tumors
ROUTE: Inhalation; **DOSE:** 4200 ug/m3/52W intermittent *CODEN: AIHAM* Bibliographic Data: Annual Meeting of American Industrial Hygiene Association. (Akron, OH) For publisher information, see AIHAAP. CODEN Reference: 20:1,1980*
TOXIC EFFECTS:
Tumorigenic - Carcinogenic by RTECS criteria
Lung, Thorax, or Respiration - Tumors
Liver - Tumors

OTHER MULTIPLE DOSE TOXICITY DATA

Rat

ROUTE: Inhalation; **DOSE:** 72 ug/m3/24H/17W continuous *CODEN: GISAAA Bibliographic Data: Gigiena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936- CODEN Reference: 54(4):68,1989*
TOXIC EFFECTS:
Blood - Pigmented or nucleated red blood cells
Biochemical - True cholinesterase
Biochemical - Lipids including transport
ROUTE: Subcutaneous; **DOSE:** 25688 mg/kg/13W intermittent *CODEN: GISAAA Bibliographic Data: Gigiena i Sanitariya. For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936- CODEN Reference: 38(1):99,1973*
TOXIC EFFECTS:
Cardiac - Other changes

Cardiac - Other changes

Guinea Pig

ROUTE: Inhalation; **DOSE:** 45 mg/m3/10W intermittent *CODEN: JIHTAB Bibliographic Data: Journal of Industrial Hygiene and Toxicology. (Cambridge, MA) V.18-31, 1936-49. For publisher information, see AEHLAU. CODEN Reference: 27:256,1945*

TOXIC EFFECTS:

Lung, Thorax, or Respiration - Fibrosis, focal (pneumoconiosis)

Liver - Fatty liver degeneration

Others - Death

4.0 STANDARDS AND REGULATIONS

1 OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
2 OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV
3 OEL-ARAB Republic of Egypt:TWA 0.5 mg(Sb)/m3 JAN 1993
4 OEL-AUSTRALIA:STEL 0.5 ppm JAN 1993
5 OEL-AUSTRALIA:TWA 0.5 mg(Sb)/m3 JAN 1993
6 OEL-AUSTRIA:TWA 0.5 mg(Sb)/m3 JAN 1993
7 OEL-BELGIUM:STEL 0.5 ppm JAN 1993
8 OEL-BELGIUM:TWA 0.5 mg(Sb)/m3 JAN 1993
9 OEL-DENMARK:TWA 0.5 mg(Sb)/m3 JAN 1993
10 OEL-FINLAND:.TWA (0.5 mg(Sb)/m3) JAN 1993
11 OEL-FRANCE:TWA 0.5 mg(Sb)/m3 JAN 1993
12 OEL-GERMANY:TWA 0.5 mg(Sb)/m3 (total dust) JAN 1993
13 OEL-GERMANY;Carcinogen JAN 1993
14 OEL-HUNGARY:STEL 0.5 mg(Sb)/m3 JAN 1993
15 OEL-POLAND:TWA 0.5 mg(Sb)/m3 JAN 1993
16 OEL-RUSSIA:STEL 1 mg/m3 JAN 1993
17 OEL-RUSSIA:TWA 0.2 mg(Sb)/m3;STEL 0.5 mg(Sb)/m3 JAN 1993
18 OEL-SWEDEN:TWA 0.5 mg(Sb)/m3 JAN 1993
19 OEL-SWITZERLAND:TWA 0.1 mg/m3;Carcinogen JAN 1993
20 OEL-SWITZERLAND:TWA 0.5 mg(Sb)/m3 JAN 1993
21 OEL-THE NETHERLANDS:TWA 0.5 mg(Sb)/m3 JAN 1993
22 OEL-THE PHILIPPINES:TWA 0.5 mg(Sb)/m3 JAN 1993
23 OEL-TURKEY:TWA 0.5 mg(Sb)/m3 JAN 1993
24 OEL-UNITED KINGDOM:TWA 0.5 mg(Sb)/m3 JAN 1993
25 OSHA PEL (Construc):8H TWA 0.5 mg(Sb)/m3 *CODEN: CFRGBR Bibliographic Data: Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) CODEN Reference: 29:1926.55,1994*
26 OSHA PEL (Fed Cont):8H TWA 0.5 mg(Sb)/m3 *CODEN: CFRGBR Bibliographic Data: Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) CODEN Reference: 41:50-204.50,1994*
27 OSHA PEL (Gen Indu):8H TWA 0.5 mg(Sb)/m3 *CODEN: CFRGBR Bibliographic Data: Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) CODEN Reference: 29:1910.1000,1994*
28 OSHA PEL (Shipyard):8H TWA 0.5 mg(Sb)/m3 *CODEN: CFRGBR Bibliographic Data: Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) CODEN Reference: 29:1915.1000,1993*

5.0 NIOSH DOCUMENTS

1 NIOSH REL TO ANTIMONY-air:10H TWA 0.5 mg(Sb)/m3
2 National Occupational Exposure Survey 1983: Hazard Code M2263; Number of Industries 72; Total Number of Facilities 7476; Number of Occupations 76; Total Number of Employees 209773; Total Number of Female Employees 56911

209773; Total Number of Female Employees 56911
3 National Occupational Hazard Survey 1974: Hazard Code M2263; Number of Industries 31; Total Number of Facilities 1540; Number of Occupations 53; Total Number of Employees 28957

6.0 REVIEWS

1 ACGIH TLV-Suspected human carcinogen *CODEN: DTLVS* Bibliographic Data: The Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) booklet issues by American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, OH, 1996 CODEN Reference: TLV/BEI,1996*
2 ACGIH TLV-TWA 0.5 mg(Sb)/m3 (Sb2O3 handling/use) *CODEN: DTLVS* Bibliographic Data: The Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) booklet issues by American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, OH, 1996 CODEN Reference: TLV/BEI,1996*
3 IARC Cancer Review:Animal Sufficient Evidence *CODEN: IMEMDT Bibliographic Data: IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1- 1972- CODEN Reference: 47:291,1989*
4 IARC Cancer Review:Group 2B *CODEN: IMEMDT Bibliographic Data: IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1- 1972- CODEN Reference: 47:291,1989*
5 IARC Cancer Review:Human Inadequate Evidence *CODEN: IMEMDT Bibliographic Data: IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1- 1972- CODEN Reference: 47:291,1989*

7.0 STATUS IN U.S.

1 EPA GENETOX PROGRAM 1988, Positive: B subtilis rec assay
2 EPA TSCA Section 8(b) CHEMICAL INVENTORY
3 EPA TSCA Section 8(d) unpublished health/safety studies
4 EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, SEPTEMBER 1997
5 On EPA IRIS database

Boric acid

RTECS - Registry of Toxic Effects of Chemical Substances

1.0 SUBSTANCE IDENTIFICATION

RTECS Number: ED4550000
Chemical Name: Boric acid
CAS Number: 10043-35-3
Molecular Formula: B-H3-O3
Molecular Weight: 61.84
Wiswesser Notation: QBQQ
Substance Investigated as: Agricultural Chemical, Tumorigen, Drug, Mutagen, Human Data, Primary Irritant, Reproductive Effector
Last Revision Date: 1997

2.0 SYNONYM(S)/TRADENAME(S)

1 Boracic acid
2 Borofax
3 Borsaure (German)
4 NCI-C56417
5 Orthoboric acid
6 Three elephant

3.0 HEALTH HAZARD DATA

ACUTE TOXICITY

TDLO/TCLO - LOWEST PUBLISHED TOXIC DOSE/CONC

Man

TDLo - ROUTE: Unreported; **DOSE:** 170 mg/kg *CODEN: RTPCAT Bibliographic Data: Rassegna di Terapia e Patologia Clinica. (Rome, Italy) V.1-8, 1929-36. For publisher information, see RFCTAJ. CODEN Reference: 1:472,1929*
TOXIC EFFECTS:
Behavioral - Wakefulness
Behavioral - Anorexia (human)
Gastrointestinal - Nausea or vomiting

Infant

TDLo - ROUTE: Oral; **DOSE:** 800 mg/kg/4W intermittent *CODEN: ADCHAK Bibliographic Data: Archives of Disease in Childhood. (British Medical Journal, POB 560B, Kennebunkport, ME 04046) V.1- 1926- CODEN Reference: 58:737,1983*
TOXIC EFFECTS:
Behavioral - Convulsions or effect on seizure threshold
Gastrointestinal - Hypermotility, diarrhea
Gastrointestinal - Nausea or vomiting

Child

TDLo - ROUTE: Oral; **DOSE:** 500 mg/kg *CODEN: JTCTDW Bibliographic Data: Journal of Toxicology, Clinical Toxicology. (Marcel Dekker, 270 Madison Ave., New York, NY 10016) V.19- 1982- CODEN Reference: 24:269,1986*
TOXIC EFFECTS:

TOXIC EFFECTS:
Gastrointestinal - Nausea or vomiting

LDLO/LCLO - LOWEST PUBLISHED LETHAL DOSE/CONC

Man

LDLo - ROUTE: Oral; **DOSE:** 429 mg/kg *CODEN: JTCTDW Bibliographic Data: Journal of Toxicology, Clinical Toxicology. (Marcel Dekker, 270 Madison Ave., New York, NY 10016) V.19- 1982- CODEN Reference: 31:345,1993*
TOXIC EFFECTS:
Cardiac - Other changes
Kidney, Ureter, and Bladder - Changes in tubules (including acute renal failure, acute tubular necrosis)
LDLo - ROUTE: Skin; **DOSE:** 2430 mg/kg *CODEN: JAMAAP Bibliographic Data: JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 128:266,1945*
TOXIC EFFECTS:
Gastrointestinal - Hypermotility, diarrhea
Skin and Appendages - Primary irritation
Nutritional and Gross Metabolic - Body temperature increase
LDLo - ROUTE: Unreported; **DOSE:** 147 mg/kg *CODEN: 85DCAI Bibliographic Data: "Poisoning; Toxicology, Symptoms, Treatments," 2nd ed., Arena, J.M., Springfield, IL, C.C. Thomas, 1970 CODEN Reference: 2:73,1970*

Woman

LDLo - ROUTE: Oral; **DOSE:** 200 mg/kg *CODEN: LANCAO Bibliographic Data: Lancet. (7 Adam St., London WC2N 6AD, UK) V.1- 1823- CODEN Reference: 2:162,1917*
TOXIC EFFECTS:
Behavioral - Fluid intake
Gastrointestinal - Hypermotility, diarrhea
Gastrointestinal - Nausea or vomiting

Infant

LDLo - ROUTE: Oral; **DOSE:** 934 mg/kg *CODEN: JAMAAP Bibliographic Data: JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 90:382,1928*
LDLo - ROUTE: Subcutaneous; **DOSE:** 1100 mg/kg *CODEN: MDSR** Bibliographic Data: U.S. Army, Chemical Corps Medical Division Special Report. (Army Chemical Center, MD) CODEN Reference: #2,1950*
TOXIC EFFECTS:
Behavioral - Tremor
Gastrointestinal - Hypermotility, diarrhea
Gastrointestinal - Nausea or vomiting
LDLo - ROUTE: Skin; **DOSE:** 1200 mg/kg *CODEN: JAMAAP Bibliographic Data: JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 129:332,1945*
TOXIC EFFECTS:
Behavioral - Convulsions or effect on seizure threshold
Skin and Appendages - Dermatitis, other
Nutritional and Gross Metabolic - Body temperature increase

Child

LDLo - ROUTE: Skin; **DOSE:** 4 gm/kg/4D *CODEN: MMWOAU Bibliographic Data: Muenchener Medicinische Wochenschrift. (Munich, Fed. Rep. Ger.) V.33-115, 1886-1973. CODEN Reference: 52:763,1905*
LDLo - ROUTE: Skin; **DOSE:** 1500 mg/kg *CODEN: QJPPAL Bibliographic Data: Quarterly Journal of Pharmacy & Pharmacology. (London, UK) V.2-21, 1929-48. For publisher information, see JPPMAB. CODEN Reference: 6:714,1933*
TOXIC EFFECTS:

TOXIC EFFECTS:
Sense Organs and Special Senses (Nose, Eye, Ear, and Taste) - Conjunctive irritation
Lung, Thorax, or Respiration - Respiratory depression
Gastrointestinal - Hypermotility, diarrhea

Rat

LCLo - ROUTE: Inhalation; **DOSE:** 28 mg/m3/4H *CODEN: 85GMAT Bibliographic Data: "Toxicometric Parameters of Industrial Toxic Chemicals Under Single Exposure," Izmerov, N.F., et al., Moscow, Centre of International Projects, GKNT, 1982 CODEN Reference: -,27,1982*

Mouse

LDLo - ROUTE: Intraperitoneal; **DOSE:** 800 mg/kg *CODEN: 14KTAK Bibliographic Data: "Boron, Metallo-Boron Compounds and Boranes," Adams, R.M., ed., New York, John Wiley & Sons, Inc., 1964 CODEN Reference: -,693,1964*
TOXIC EFFECTS:
Behavioral - Somnolence (general depressed activity)
Behavioral - Ataxia
Nutritional and Gross Metabolic - Body temperature decrease

Rabbit

LDLo - ROUTE: Intravenous; **DOSE:** 800 mg/kg *CODEN: 14KTAK Bibliographic Data: "Boron, Metallo-Boron Compounds and Boranes," Adams, R.M., ed., New York, John Wiley & Sons, Inc., 1964 CODEN Reference: -,693,1964*
TOXIC EFFECTS:
Behavioral - Somnolence (general depressed activity)
Behavioral - Ataxia
Nutritional and Gross Metabolic - Body temperature decrease
LDLo - ROUTE: Oral; **DOSE:** 4 gm/kg *CODEN: MDSR** Bibliographic Data: U.S. Army, Chemical Corps Medical Division Special Report. (Army Chemical Center, MD) CODEN Reference: #2,1950*
TOXIC EFFECTS:
Behavioral - Tremor
Gastrointestinal - Hypermotility, diarrhea
Gastrointestinal - Nausea or vomiting
LDLo - ROUTE: Parenteral; **DOSE:** 670 mg/kg *CODEN: RTPCAT Bibliographic Data: Rassegna di Terapia e Patologia Clinica. (Rome, Italy) V.1-8, 1929-36. For publisher information, see RFCTAJ. CODEN Reference: 1:472,1929*
TOXIC EFFECTS:
Nutritional and Gross Metabolic - Body temperature decrease
LDLo - ROUTE: Subcutaneous; **DOSE:** 150 mg/kg *CODEN: HBAMAK Bibliographic Data: "Abdernalden's Handbuch der Biologischen Arbeitsmethoden." (Leipzig, Ger. Dem. Rep.) CODEN Reference: 4:1289,1935*

Guinea Pig

LDLo - ROUTE: Oral; **DOSE:** 1 gm/kg *CODEN: RAMAAB Bibliographic Data: Revista de la Asociacion Medica Argentina. (Buenos Aires, Argentina) V.1-89, 1915-76. Discontinued. CODEN Reference: 46:1493,1932*
TOXIC EFFECTS:
Gastrointestinal - Nausea or vomiting
Gastrointestinal - Other changes

Dog

LDLo - ROUTE: Oral; **DOSE:** 1780 mg/kg *CODEN: JAMAAP Bibliographic Data. JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 128:266,1945*
TOXIC EFFECTS:
Brain and Coverings - Meningeal changes
Lung, Thorax, or Respiration - Cyanosis
Gastrointestinal - Nausea or vomiting

LDLo - ROUTE: Parenteral; **DOSE:** 1 gm/kg *CODEN: RTPCAT Bibliographic Data: Rassegna di Terapia e Patologia Clinica. (Rome, Italy) V.1-8, 1929-36. For publisher information, see RFCTAJ. CODEN Reference: 1:472,1929*
TOXIC EFFECTS:
Peripheral Nerve and Sensation - Flaccid paralysis without anesthesia (usually neuromuscular blockage)
LDLo - ROUTE: Subcutaneous; **DOSE:** 1 gm/kg *CODEN: JAMAAP Bibliographic Data: JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 128:266,1945*
TOXIC EFFECTS:
Brain and Coverings - Meningeal changes
Lung, Thorax, or Respiration - Cyanosis
Gastrointestinal - Nausea or vomiting

LD50/LC50 - LETHAL DOSE/CONC 50% KILL

Rat

LD50 - ROUTE: Intravenous; **DOSE:** 1330 mg/kg *CODEN: MDSR** Bibliographic Data: U.S. Army, Chemical Corps Medical Division Special Report. (Army Chemical Center, MD) CODEN Reference: #2,1950*
TOXIC EFFECTS:
Behavioral - Tremor
Gastrointestinal - Hypermotility, diarrhea
Gastrointestinal - Nausea or vomiting
LD50 - ROUTE: Oral; **DOSE:** 2660 mg/kg *CODEN: JAMAAP Bibliographic Data: JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 128:266,1945*
LD50 - ROUTE: Subcutaneous; **DOSE:** 1400 mg/kg *CODEN: 14KTAK Bibliographic Data: "Boron, Metallo-Boron Compounds and Boranes," Adams, R.M., ed., New York, John Wiley & Sons, Inc., 1964 CODEN Reference: -,693,1964*
TOXIC EFFECTS:
Behavioral - Somnolence (general depressed activity)
Behavioral - Ataxia
Nutritional and Gross Metabolic - Body temperature decrease

Mouse

LD50 - ROUTE: Intravenous; **DOSE:** 1240 mg/kg *CODEN: JPETAB Bibliographic Data: Journal of Pharmacology and Experimental Therapeutics. (Williams & Wilkins Co., 428 E. Preston St., Baltimore, MD 21202) V.1- 1909/10- CODEN Reference: 134:117,1961*
TOXIC EFFECTS:
Behavioral - Convulsions or effect on seizure threshold
Lung, Thorax, or Respiration - Respiratory depression
Gastrointestinal - Hypermotility, diarrhea
LD50 - ROUTE: Oral; **DOSE:** 3450 mg/kg *CODEN: JAMAAP Bibliographic Data: JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 128:266,1945*
LD50 - ROUTE: Subcutaneous; **DOSE:** 1740 mg/kg *CODEN: JAMAAP Bibliographic Data: JAMA, Journal of the American Medical Association. (AMA, 535 N. Dearborn St., Chicago, IL 60610) V.1- 1883- CODEN Reference: 128:266,1945*

Guinea Pig

LD50 - ROUTE: Subcutaneous; **DOSE:** 1200 mg/kg *CODEN: MDSR** Bibliographic Data: U.S. Army, Chemical Corps Medical Division Special Report. (Army Chemical Center, MD) CODEN Reference: #2,1950*
TOXIC EFFECTS:
Behavioral - Tremor
Gastrointestinal - Hypermotility, diarrhea

Gastrointestinal - Hypermotility, diarrhea
Gastrointestinal - Nausea or vomiting

IRRITATION

SKIN - STANDARD DRAIZE TEST

Human

ROUTE: Skin; **DOSE:** 15 mg/3D intermittent; **REACTION:** Mild *CODEN: 85DKA8 Bibliographic Data: "Cutaneous Toxicity, Proceedings of the 3rd Conference, 1976," Drill, V.A., and P. Lazar, eds., New York, Academic Press, Inc. 1977 CODEN Reference: -,127,1977*

REPRODUCTIVE EFFECTS

Rat

ROUTE: Inhalation; **DOSE:** 9600 ug/m3/4H; **DURATION:** male 16W prior to mating *CODEN: GTPZAB Bibliographic Data: Gigiena Truda i Professional'nye Zabolevaniya. Labor Hygiene and Occupational Diseases. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1-36, 1957-1992. For publisher information, see MTPEEI CODEN Reference: 16(11):13,1972*
TOXIC EFFECTS:
Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)
Paternal Effects - Testes, epididymis, sperm duct
ROUTE: Oral; **DOSE:** 52 mg/kg; **DURATION:** male 26W prior to mating *CODEN: EVHPAZ Bibliographic Data: EHP, Environmental Health Perspectives. (U.S. Government Printing Office, Supt of Documents, Washington, DC 20402) No.1- 1972- CODEN Reference: 13:69,1976*
TOXIC EFFECTS:
Paternal Effects - Spermatogenesis (including genetic material, sperm morphology, motility, and count)
ROUTE: Oral; **DOSE:** 45 gm/kg; **DURATION:** male 90D prior to mating *CODEN: TXAPA9 Bibliographic Data: Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959- CODEN Reference: 23:351,1972*
TOXIC EFFECTS:
Paternal Effects - Testes, epididymis, sperm duct
ROUTE: Oral; **DOSE:** 1596 mg/kg; **DURATION:** female 0-20D of pregnancy *CODEN: FAATDF Bibliographic Data: Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981- CODEN Reference: 32:179,1996*
TOXIC EFFECTS:
Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)
Specific Developmental Abnormalities - Musculoskeletal system
ROUTE: Oral; **DOSE:** 6600 mg/kg; **DURATION:** female 1-21D of pregnancy *CODEN: FAATDF Bibliographic Data: Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981- CODEN Reference: 18:266,1992*
TOXIC EFFECTS:
Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)
Specific Developmental Abnormalities - Musculoskeletal system
Specific Developmental Abnormalities - Other developmental abnormalities
ROUTE: Oral; **DOSE:** 5390 mg/kg; **DURATION:** female 6-15D of pregnancy *CODEN: FAATDF Bibliographic Data: Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981- CODEN Reference: 18:266,1992*
TOXIC EFFECTS:
Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per

Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)
Effects on Embryo or Fetus - Fetal death
Specific Developmental Abnormalities - Musculoskeletal system

Mouse

ROUTE: Oral; **DOSE:** 7684 mg/kg; **DURATION:** female 1-17D of pregnancy *CODEN: FAATDF Bibliographic Data: Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981- CODEN Reference: 18:266,1992*
TOXIC EFFECTS:
Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)
ROUTE: Oral; **DOSE:** 17051 mg/kg; **DURATION:** female 1-17D of pregnancy *CODEN: FAATDF Bibliographic Data: Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981- CODEN Reference: 18:266,1992*
TOXIC EFFECTS:
Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)
ROUTE: Oral; **DOSE:** 8136 mg/kg; **DURATION:** female 1-18D of pregnancy *CODEN: EVHPAZ Bibliographic Data: EHP, Environmental Health Perspectives. (U.S. Government Printing Office, Supt of Documents, Washington, DC 20402) No.1- 1972- CODEN Reference: 102(SUPPL 7):107,1994*
TOXIC EFFECTS:
Maternal Effects - Other effects
Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)
ROUTE: Oral; **DOSE:** 18054 mg/kg; **DURATION:** female 1-18D of pregnancy *CODEN: EVHPAZ Bibliographic Data: EHP, Environmental Health Perspectives. (U.S. Government Printing Office, Supt of Documents, Washington, DC 20402) No.1- 1972- CODEN Reference: 102(SUPPL 7):107,1994*
TOXIC EFFECTS:
Maternal Effects - Uterus, cervix, vagina
Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)

Rabbit

ROUTE: Oral; **DOSE:** 3500 mg/kg; **DURATION:** female 6-19D of pregnancy *CODEN: TOXID9 Bibliographic Data: Toxicologist. (Soc. of Toxicology, Inc., 475 Wolf Ledge Parkway, Akron, OH 44311) V.1- 1981- CODEN Reference: 12:103,1992*
TOXIC EFFECTS:
Effects on Embryo or Fetus - Fetal death
Specific Developmental Abnormalities - Cardiovascular (circulatory) system
ROUTE: Oral; **DOSE:** 3500 mg/kg; **DURATION:** female 6-19D of pregnancy *CODEN: NTIS** Bibliographic Data: National Technical Information Service. (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information. CODEN Reference: PB92-129550*
TOXIC EFFECTS:
Specific Developmental Abnormalities - Craniofacial (including nose and tongue)
Specific Developmental Abnormalities - Other developmental abnormalities
ROUTE: Oral; **DOSE:** 3500 mg/kg; **DURATION:** female 6-19D of pregnancy *CODEN: FAATDF Bibliographic Data: Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981- CODEN Reference: 34:176,1996*
TOXIC EFFECTS:
Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)
Effects on Fertility - Litter size (e.g., # fetuses per litter, measured before birth)
Specific Developmental Abnormalities - Cardiovascular (circulatory) system
ROUTE: Oral; **DOSE:** 1750 mg/kg; **DURATION:** female 7-20D of pregnancy *CODEN: EVHPAZ Bibliographic Data: EHP, Environmental Health Perspectives. (U.S. Government Printing Office, Supt of Documents, Washington, DC 20402) No.1- 1972-*

Government Printing Office, Supt of Documents, Washington, DC 20402) No.1- 1972- CODEN Reference: 102(SUPPL 7):107,1994
TOXIC EFFECTS:
Maternal Effects - Uterus, cervix, vagina
Maternal Effects - Other effects
ROUTE: Oral; **DOSE:** 3500 mg/kg; **DURATION:** female 7-20D of pregnancy *CODEN: EVHPAZ Bibliographic Data: EHP, Environmental Health Perspectives. (U.S. Government Printing Office, Supt of Documents, Washington, DC 20402) No.1- 1972- CODEN Reference: 102(SUPPL 7):107,1994*
TOXIC EFFECTS:
Effects on Fertility - Post-implantation mortality (e.g., dead and or resorbed implants per total number of implants)
Effects on Embryo or Fetus - Fetotoxicity (except death, e.g., stunted fetus)
Specific Developmental Abnormalities - Musculoskeletal system

GENETIC EFFECTS

MUTATIONS IN MICROORGANISMS

Bacteria - E Coli

DOSE: 17000 ppm/24H (-S9) *CODEN: AMNTA4 Bibliographic Data: American Naturalist. (Univ. of Chicago Press, Journals Div., POB 37005, Chicago, IL 60637) V.1- 1867- CODEN Reference: 85:119,1951*

OTHER MULTIPLE DOSE TOXICITY DATA

Rat

ROUTE: Oral; **DOSE:** 45 gm/kg/90D continuous *CODEN: TXAPA9 Bibliographic Data: Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959- CODEN Reference: 23:351,1972*
TOXIC EFFECTS:
Brain and Coverings - Changes in brain weight
Nutritional and Gross Metabolic - Weight loss or decreased weight gain
Others - Changes in testicular weight
ROUTE: Oral; **DOSE:** 244 gm/kg/2Y continuous *CODEN: TXAPA9 Bibliographic Data: Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959- CODEN Reference: 23:351,1972*
TOXIC EFFECTS:
Blood - Pigmented or nucleated red blood cells
Nutritional and Gross Metabolic - Weight loss or decreased weight gain
Others - Changes in testicular weight

Mouse

ROUTE: Oral; **DOSE:** 42 gm/kg/14D continuous *CODEN: NTPTR* Bibliographic Data: National Toxicology Program Technical Report Series. (Research Triangle Park, NC 27709) No.206- CODEN Reference: NTP-TR-324,1987*
TOXIC EFFECTS:
Others - Death
ROUTE: Oral; **DOSE:** 156 gm/kg/13W intermittent *CODEN: NTPTR* Bibliographic Data: National Toxicology Program Technical Report Series. (Research Triangle Park, NC 27709) No.206- CODEN Reference: NTP-TR-324,1987*
TOXIC EFFECTS:
Gastrointestinal - Other changes
Blood - Changes in spleen
Others - Death

Dog

Dog

ROUTE: Oral; **DOSE:** 23 gm/kg/90D continuous *CODEN: TXAPA9 Bibliographic Data: Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959- CODEN Reference: 23:351,1972*
TOXIC EFFECTS:
Liver - Changes in liver weight
Endocrine - Changes in thyroid weight
Others - Changes in testicular weight

4.0 STANDARDS AND REGULATIONS

1 EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION *CODEN: FEREAC Bibliographic Data: Federal Register. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) V.1- 1936- CODEN Reference: 54:7740,1989*
2 OEL-RUSSIA:STEL 10 mg/m3 JAN 1993

5.0 NIOSH DOCUMENTS

1 National Occupational Exposure Survey 1983: Hazard Code X7080; Number of Industries 187; Total Number of Facilities 27071; Number of Occupations 128; Total Number of Employees 489668; Total Number of Female Employees 211838
2 National Occupational Exposure Survey 1983: Hazard Code X8324; Number of Industries 3; Total Number of Facilities 84; Number of Occupations 4; Total Number of Employees 2919; Total Number of Female Employees 1712

6.0 REVIEWS

1 TOXICOLOGY REVIEW *CODEN: FNSCA6 Bibliographic Data: Forensic Science. (Lausanne, Switzerland) V.1-11, 1972-78. For pub lisher information, see FSINDR. CODEN Reference: 2:67,1973*
2 TOXICOLOGY REVIEW *CODEN: CLCHAU Bibliographic Data: Clinical Chemistry (Winston-Salem, NC). (American Assoc. for Clinical Chemistry, 1725 K St., NW, Washington, DC 20006) V.1- 1955- CODEN Reference: 19:361,1973*
3 TOXICOLOGY REVIEW *CODEN: JOPDAB Bibliographic Data: Journal of Pediatrics. (C.V. Mosby Co., 11830 Westline Industrial Dr., St. Louis, MO 63141) V.1- 1932- CODEN Reference: 61:531,1962*

7.0 STATUS IN U.S.

1 EPA TSCA Section 8(b) CHEMICAL INVENTORY
2 EPA TSCA Section 8(d) unpublished health/safety studies
3 EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, SEPTEMBER 1997
4 NTP Carcinogenesis Studies (feed);no evidence:mouse NTPTR* NTP-TR-324,87